

RELEASE 1.0

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A MONTHLY REPORT BY ESTHER DYSON

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GETTING ON & AROUND THE INTERNET

by Jerry Michalski

What kind of Internet connection do you have? None at all? A transient, intermittent drip through a gateway? A spurty, occasional dial-up line that gives you only a tempting taste of the real thing? A TCP-enriched dial-up link that's more filling? Or the mainline big rush: a live, fast, full-time TCP connection that lets you snarf any treats you can find?

If you wanted that live feed, would you know what software and equipment to buy or whom to buy it from? Would you know where to send your customers so they could communicate with you freely? You can't call Corporate Software or Compucom and order one. You can't drop into Egghead or call your favorite mail-order discounter, either. And once you are connected, how do you find your way? It's a jungle out there. Where do you find the tools you need, and how do you put them together? And who's going to support them?

This issue of Release 1.0 focuses on Internet software and services that improve information access, navigation and retrieval. As background, starting on page 14, we describe some of the Internet's basic tools and functions. Where appropriate, we offer ways to get hold of the tools.

We also profile some entrepreneurs and developers who are building interfaces atop the tools -- tucking the arcane protocols, command structures and file types neatly into the background and adding new value. Some of this value is in the software and services they integrate, but a lot of it is in how they design and present information: These companies act as publishers, not merely service providers.

Even with difficult access and arcane commands to master, the Internet has attracted millions, but millions more would use it if it were less painful. That's what's happening now. For better and worse, 1994 marks the beginning of the shrink-wrapped Internet interface.

Developers and service providers are making the Internet available to broad audiences with new and often experimental tools, built on top of tried and true technical protocols and application primitives -- with interfaces that run on Macintosh and Windows platforms. In a nice display of Internet spirit, many of the offerings come from the Internet itself. In many cases, ➡

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their components are either in the public domain or available for reasonable licensing fees, unlike most components in the traditional software market. This collaborative ethic is leading to a boom in software development, which in turn is leading to more publishing, communicating and experimenting. And there is still plenty of work left to do (see box).

Help still wanted

Most Internet access offerings still use Internet nomenclature: They refer to Gopher, Archie and other memorable but not always descriptive tool names (who is Veronica? what's an FTP? I don't want to Finger anyone!). One small company, Pipeline, takes an important simplifying step by using plain text to describe a function, followed by its Internet name, for the curious: "Find a file (WAIS)".

But there's still a need for expert/agent interfaces. They would step searchers carefully through the type of search (how precisely do you know what you want? do you want to browse?), the search domain (scientific abstracts? informal postings? frequently asked questions?) and the search refinement, while hiding the underlying tools.

Search details could accompany query responses: "We have just searched four large databases of dissertation abstracts, which cover approximately 80 percent of the total abstracts published in the US and Europe." Or, less satisfying but very helpful: "The only relevant database we could find covers only neurobiological research in France; would you like to post a message to alt.bio.neuro.questions?"

The search "expert" could even lead the user to post a question in the appropriate news list, which can be a very quick way of generating information that the more automated search tools just can't uncover because it doesn't exist yet online, but in someone's mind. Knowing which list to post to is valuable knowledge, indeed. The software could contain an expert-system engine that manages the tools and links, or perhaps elegantly designed decision trees created by domain experts. Updates would be available over the Internet -- for a subscription fee, of course.

Two small companies, Pipeline and Spry (pages 9 and 11, respectively), are on the leading edge of the movement to shrink-wrap a two-way pipe to the Internet and bring it to new audiences. The surge of demand for Internet connectivity will likely make them both somewhat successful, but their challenge is to make the Internet's value available through their systems.

Why ask why?

Although the tools available today aren't yet as sophisticated as our text-retrieval agent example, the public's interest in the Internet is relatively easy to explain, and has been heightened by all the recent media attention. The Internet can open new vistas, new kinds of connectedness. Its expansiveness is attractive to explorers.

Most commercial online services now offer gateways for Internet e-mail, and many will soon offer access to more of its interactive, realtime features.

But people often want to try things firsthand -- and they want them now. Ideal potential users (i.e., likely heavy spenders) also want more choices and flexibility than the commercial services have offered to date.

Corporate users, of course, need more than just cool applications to justify access to the Internet, especially when they suspect that they are exposing their organizations to possible infiltration. In some cases, they won't have much choice about participating in some fashion: An Internet e-mail address is quickly becoming a requirement for business communications, as a fax number did in the US around 1988. Also, privacy-enhanced mail will be common in two years, helping companies conquer their fear of e-mail exposure. In the meantime, though, novice users are well advised to treat their Internet traffic as if it is readable by anyone.

A link to the world

The Internet's reach is important. For practical and technical reasons, most business messaging, document-management and publishing applications focus inside corporations, not outside. Even voicemail has an inward bias: You can copy a voicemail message to someone in the same voicemail system, but not outside. Workers use document-management, workflow and imaging systems to streamline production within their companies; they use e-mail packages, word processors and publishing systems to turn out contracts, bids and elegant product literature. But then they resort to the postal services, fax and telephone for the links to the outside world. The exceptions are usually cumbersome: X.400 and EDI require elaborate arrangements and often expensive gear. Lotus Notes is beginning to make a dent in this market, in large part because it has a secure, built-in replication capability. But it also creates a sub-community of Notes users.

It makes sense for many companies to stick to an interim e-mail gateway strategy for the majority of their employees. Internet e-mail's simplicity is a dream come true to people who have installed corporate e-mail gateways or attempted to send a message to someone with an X.400 address. In an age of downsizing and virtual organizations, Internet e-mail offers critical intercompany data connectivity approaching what we enjoy in the phone and fax world.¹ Mobile enhancements such as RadioMail's wireless data-messaging service allow people to be where they need to be and still participate in conversations.

¹ In fact, the Internet will have serious effects on the phone and fax worlds. For example, Carl Malamud, director of the non-profit Internet Multicasting Service, is constantly experimenting with new uses of the Internet. Alongside digitized "radio" talk-show broadcasts and other creative endeavors, he has created a free remote-faxing capability that is rapidly gaining distribution. Companies that send many international faxes may wish to examine this service, which uses the Internet to transport fax files to a participating node that is a local call from their destinations. Local users agree to forward the faxes to the appropriate fax machines. In exchange, they can sell ad space on the fax cover pages. Long-distance phone companies clearly aren't in imminent danger of losing major chunks of revenue, but this is a harbinger of things to come. It points to the Internet as yet another bypass alternative, and to the funding models that will help finance it.

E-mail is a natural vehicle for mailing lists and document exchange. Even better, e-mail can be an access method to many of the applications covered in this issue. For example, many File Transfer Protocol (FTP) sites support e-mailed requests. The sender has to know what file to ask for and how to ask for it, but the approach works.

It's the connectivity, stupid!

But it's the special nature of Internet connectivity (see box, opposite) -- its rough, informal homogeneity -- that adds power. For example, when you order a telephone, your friendly monopolist phone company (or duopolist cellular carrier) assigns you a unique phone number according to a strict convention and logs you into its directory. You don't get calls if it doesn't know you exist. There's no such monopoly in the data world. You can install a LAN and nobody need know about it, but you won't have access outside. The Internet's naming and addressing schemes perform the phone-number-assignment function for the Internet in a collaborative way.

A full Internet connection offers more power than a gateway. There are many things you can't do through a store-and-forward gateway. For starters, you can't run remote applications, browse or do synchronous work with others. The ability to browse and select documents directly is far more useful than having to make remote requests with perfect foreknowledge.

Get 80 percent of the benefit for 20 percent of the fuss -- and cost

More interestingly, applications on the Internet are beginning to deliver features that startups are offering only over LANs. For example, companies such as Collabra, Saros and Documentum exist because it's still difficult to share, coordinate and synchronize files in DOS and NetWare.

Hypertext and text retrieval have been slow-growth markets with a few star performers. Most hypertext packages can't link to objects outside themselves, let alone to objects across the network. And all too often, the network stops at the company walls, but the documents that you want to link to exist outside. The network operating systems are improving, but still have a way to go. Microsoft's OLE2 (Object Linking and Embedding, version 2) promises object embeddability within documents, but it can be hard to program in and takes considerable overhead. It's a reasonable way to create complex documents without creating overly complex applications, but it's not a network-aware hypertext publishing system.

Groupware has been dogged by heterogeneous platforms and lack of standards. Lotus Notes had to overcome the cross-platform problem by writing its own cross-platform middleware layer of services; so do most companies that attempt to write good groupware tools. They also typically use the phone system and modems, not wide-area data networks, to link across distances.

Worse still, groupware is always bolted atop the network operating system, rather than being a native function within it. (It's the difference between having to run a special groupware application that lets you share documents and being able to share any document you're working on at any time.)

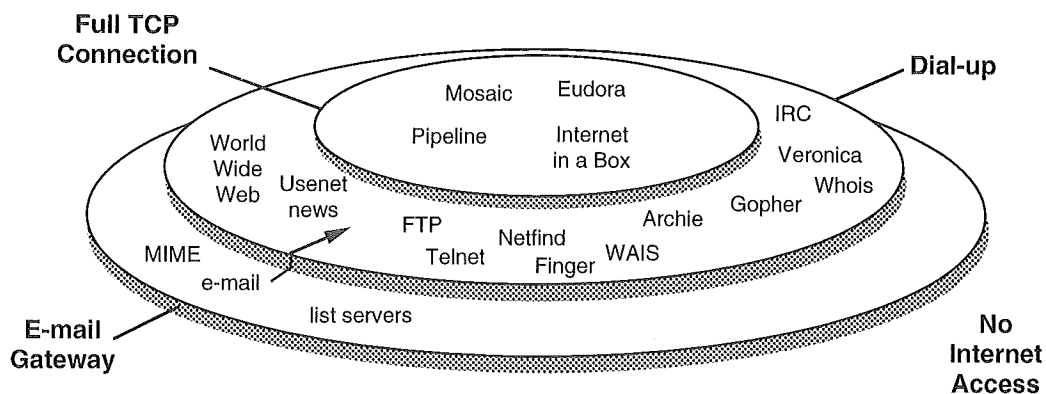
The Internet's connectivity requirements and conventions make it an excellent collaboration medium. For example, the hyperlinked publishing model

behind Gopher and the World Wide Web (see page 17) has led to an explosion of documents available for browsing that were previously hard to reach, or even know about. This model can easily let corporations publish documents off a virtual back porch to constituencies that need access.

What is this thing called the Internet?

The Internet is a large meta-network of interconnected networks. Participating organizations share an address space, a series of fundamental communication protocols and applications and -- at least so far -- an ethic of cooperation.

There are different levels of connectedness to the Internet, illustrated below as concentric circles. The closer you get to looking like a part of the Internet and obeying its native protocols, the greater the number of features you can use. The speed of your link usually increases as you climb the hierarchy; so does the complexity of managing your connection, especially for first-timers. Simplifying that is what this issue of Release 1.0 is about.



E-mail gateways (the intermittent drips we mentioned early on) are the simplest way to get on the Internet, and they offer surprising range and power. The next step up is a dial-up account to an Internet access provider, which typically runs Unix. This gives you access to Telnet, FTP, the World Wide Web and other features we describe in the last section (page 14), but not those that require TCP/IP (Transmission Control Protocol/Internet Protocol, the primary protocol used within the Internet).

The last stage is essentially native TCP/IP support, which is often a full-time link, but can happen over an intermittent dial-up connection using protocols such as SLIP and PPP (the Serial Link Internet Protocol and Point-to-Point Protocol; see page 15). Companies that run on Unix get this connectivity for free. So will companies running NetWare or NT that choose to run TCP/IP.

O PIONEERS!

Of course, the real pioneers are the people who developed the low-level protocols that everyone is using. They put their code in the public domain, encouraged others to experiment and worked with them to agree on standards. Most of the organizations covered here are customizing and bullet-proofing those components -- to make a profit. But they share the common goals of facilitating the flow of real-world information on the Internet and making the Internet available and attractive to ordinary folks.

The offerings covered in this section go from specific- to general-purpose. Eudora offers elegant TCP/IP e-mail client software, and not much else. NCSA Mosaic, an elegant front-end to the World Wide Web global hypertext environment, makes the Web more appealing and useful. The Pipeline is a commercial online service that makes use of native TCP/IP features. Spry's Internet-in-a-Box will bundle Internet access with a custom version of Mosaic and a set of applications to offer another kind of commercial service. Where Pipeline has the look and feel of an online service, Spry's offering blends into a typical Windows desktop.

EUDORA: GREAT MAIL, NO FUSS

In 1988, the University of Illinois at Urbana-Champaign's Computer Services Office (CSO) was offering Internet e-mail accounts to students and staff, but was losing ground to a campus PROFS-based system that had a more approachable interface. The CSO staff brainstormed what they wanted (which included access to SMTP and POP mail servers, message filters and offline use), and decided it would be too much trouble to write such an application.

Steve Dorner, then a CSO research programmer, looked for a commercial package that would make the system more attractive and useful and was stymied: All the commercial offerings had proprietary servers and none would support offline use. So, with management's approval, he started to write a mail program himself. In a year, he had written Eudora,² a simple and elegant Macintosh mail client that he put on the Internet as freeware in 1989. It was instantly popular.

The university was happy, but wanted Dorner to turn his attention to other tasks that interested him far less. Meanwhile, at Qualcomm, a San Diego-based wireless communication-system provider,³ senior engineer John Noerenberg had started using Eudora for the company. He also started an engineering effort to write a version of Eudora for Windows. He and Dorner became friends, and Noerenberg approached Dorner about working at Qualcomm, which he finally joined in the summer of 1992 (Dorner telecommutes from Urbana).

 2 Its development name was UIUC Mail, which was bland, to say the least. Since it uses POP, the Post Office Protocol, Dorner decided to call the application Eudora, after Eudora Welty, author of the short story "Why I Live at the Post Office."

3 Qualcomm sells the OmniTracs satellite-based fleet-management system and is developing CDMA technology for digital cellular carriers; see Release 1.0, 10-92.

Eight months later Dorner released an improved, freeware version of Eudora -- and got a similar response from Qualcomm's management: Thank you, but we'd like you to work on this thing over here now.

Payware and freeware

Dorner considered starting a company for Eudora, which he was not anxious to do; he considered a freeware-and-paid-support system such as Cygnus offers (see Release 1.0, 4-90), which Qualcomm management didn't agree to. Finally, he started a small group at Qualcomm to create a commercial version of Eudora (on the Mac and on PCs), which was an easy sell to Qualcomm's top management. It shipped in September 1993, alongside a less elaborate but still improved freeware version.⁴ Eudora now has a large, mostly individual user base with a few large site licenses, principally at universities. At least 20,000 people use the commercial version; between 100,000 and 500,000 use the free version.

Noerenberg, now the Eudora product manager, sees Eudora as a portal through which people can reach the Internet. He and Dorner, who remains Eudora's guide and central resource, would like to enhance Eudora to be an engine for secure communications and commerce. That means making Eudora mail more secure through privacy enhancements, as well as more amenable to higher-level communication activities such as network scheduling and eventually perhaps EDI transactions. This may well involve partnerships with other companies, which Qualcomm is beginning to seek out. Moving forward is important, because the latest versions of commercial e-mail packages such as Lotus' cc:Mail Remote are starting to support offline work; people who have LAN e-mail are not likely to want to use two packages.

The first release of Eudora was popular partly due to its clean design and respect for the Macintosh programming rules. For example, Eudora can make use of AppleEvents, Balloon Help and other extensions to the OS. Over time, AppleScript and PowerTalk (part of System 7 Pro, or PowerShare) should allow Eudora to cooperate closely with other Macintosh applications, such as more elaborate mail filters or fax and voicemail servers.

NCSA MOSAIC: SKIP ACROSS THE WEB IN STYLE

Beefy research problems are good for the Internet. The World Wide Web, a global hypertext system, was a by-product of high-energy physics research at the European Center for Nuclear Research (CERN). Likewise, necessity led the National Center for Supercomputing Applications staff in Champaign, IL, to extend the Web with NCSA Mosaic, one of the most compelling pieces of Internet software in circulation today. Mosaic, which adds video and font support and inline bitmaps and sounds to the World Wide Web, has single-handedly reinvigorated interest in the original text-only Web.

 4 Qualcomm's Eudora for Macintosh or PC now costs \$65 for a single user, \$45 for 2-49, and gradually drops to \$32.50 for 500-999; the freeware version (available via FTP at FTP.qualcomm.com in /mac/eudora and /pseudora /windows) does not include mail filters and other power tools.

As with its relatives Gopher and the World Wide Web, the Mosaic client viewer hides all the details of file transfer and formatting from end-users, who can just point and click. But it does more: By embedding multimedia elements and display styles in the Web documents, Mosaic collapses the functions of display and navigation. The materials are not just nodes at the end of menu sequences, they become links themselves. Illustrations can be inside documents (albeit only as inline bitmaps so far) rather than outside, in separate windows driven by special viewers.

Software-writing opportunity: As it's currently defined, HTML (Mosaic's underlying description language, see page 18) doesn't support object graphics. That means you can't easily create a diagram in which various objects scattered around a page (say, ellipses containing text, connected by lines) can act as links. The closest thing to this is the IsMap tag, which points to a bitmap. You can emulate object behavior, but it's difficult, as it is in Apple's HyperCard, which only has bitmap graphics.

The NSFnet, an early constituent of the Internet, was designed to link five major US supercomputing centers, including NCSA, which is funded by the National Science Foundation. The distributed, collaborative nature of NCSA research efforts naturally led its Software Development Group to create very high-performance information-sharing and collaboration software. Before Mosaic, the group created versions of Telnet for Macs and PCs in 1985 and 1986 and visualization systems called Image and Datascape in the late 1980s.

Then the developers began to mix and match the applications with other Internet functions. One result was Collage, a collaborative-work tool that lets people view documents simultaneously and add their comments. Another result was Mosaic itself, which so far has proven much more popular than Collage. (Perhaps people need to browse and get familiar with the territory first, then they want to connect with each other to create materials.)

F U CN RD THS, U CN PBLSH, 2

Once you're connected, Mosaic can make content on the Internet seem simple and compelling. Joseph Hardin, Associate Director of NCSA's software development group, thinks of Mosaic as a universal publishing vehicle. With it (and some authoring help), all participants can be providers of information. They can share structured documents, applications, and so on, weaving links between the individual elements that reflect their relationships. Wired Magazine, Adam Curry's MTV Report and others are already online in Mosaic.

Already Gopher servers are making a big difference in the public availability of government documents, including pending legislation, White House speeches and petitioners' filings (of course, the FCC, most senators and representatives aren't online yet, but it could happen). Imagine conference proceedings in Mosaic that include the illustrations from speeches or even a video of the presenters, all available on your local Internet server.

Communities could use Mosaic to share information. NCSA has been working with Hybrid Network Systems of Cupertino to offer scalable community Ethernet over cable tv networks, using Mosaic, of course. (Hybrid sells

adapters that allow cable tv operators to offer TCP connections of up to 10 megabits per second to the home, and fast modem speeds in return.)

Piecing together the picture

As Mosaic and the Internet change and mature, capacity and link management will become major issues. It will be interesting to see who will handle them and how.

Capacity is already an issue. To request a full-motion video clip in Mosaic, a user need only click on the thumbnail illustration that invokes it. It may take two minutes to retrieve, even with a fast Internet hookup, but with no further intervention she will see an image, hear a recording or see a video clip. This ease of use (and lack of feedback on costs or resource consumption), coupled with Mosaic's increasing popularity, will lead to increasingly heavy network traffic.

The hypertext link-management problem is naturally exacerbated when the level of granularity goes from whole documents to chunks within documents. Users may want to distinguish between different sets of links on a given page (e.g., beginner, experienced, expert). They may wish to superimpose their own links and make them visible to their own audience.

Mosaic, which requires a TCP connection (SLIP or PPP will work), would nicely complement a powerful mailer such as Eudora and a news reader. That's what Spry is doing, albeit with its own mailer. The company, described on page 11, has licensed the Mosaic software from NCSA and expects to deliver the first commercial implementation as part of its Internet-in-a-Box package in the second quarter of 1994.

PIPELINE: NOT JUST ANOTHER PRETTY FACE

A year ago, James Gleick didn't imagine he would be running a commercial Internet access service today. After all, Gleick is a writer, known for his books (*Genius and Chaos*), or as a reporter and editor at the New York Times from 1978 to 1987. In fact, he had committed to writing another book about the history of the telephone, but he's hardly touched it in nine months. Instead, he's been following an entrepreneurial instinct.

While cruising the Internet researching *Chaos*, Gleick realized that the Internet, though increasingly popular, is not simple enough for ordinary end-users. He thought someone ought to write software to simplify it.

The result is Pipeline, which is both a software package that Gleick is licensing to others so they can start similar regional services and a New York-based regional online service in its own right. Early licensees include CalTech and Ireland On-Line, with more in the works.

Gleick is focused on building a local community, not a nationwide service. To that end, he wants to nurture Pipeline as a local gathering place; to attract a critical mass of people and link them with real-life events. To make the real-life connection, he is helping New York area publishers, city government, private companies and other organizations get online. He hopes,

for example, that local publishers will put excerpts from their backlists online. That way, people will have access to some snippets of information that would normally lie fallow, and they may be stimulated to purchase the entire works.

"I'm a writer, so I figured the worst thing that could happen was that I would go back to writing. But the worst thing was really that this would succeed."

-- James Gleick, Pipeline

Surfin' the Pipeline

The Pipeline is very new: Gleick and his chief developer, Uday Ivatury, started work on the software only last April; the service started operations in Manhattan and neighboring areas in December. Neither Gleick nor Ivatury are of the Internet world. Before joining Pipeline, Ivatury was programming international banking applications on mainframes at Vertex Business Systems. Before that he was at Dean Witter and IBM. Ivatury and Gleick met at the Manhattan Bridge Club, where Gleick introduced Ivatury to OKBridge, an Internet version of the game -- and got him hooked on the Internet. Like Gleick, Ivatury never thought he'd be doing this; Pipeline is the first Windows and Unix code he's ever written.

By writing a Windows front-end to its own custom version of the Serial Line Internet Protocol (called Pink SLIP; see page 15), Pipeline can offer the convenience and features of a bulletin-board system or mainstream online service with the power of a full Internet connection (governed only by your modem's top speed), all behind a traditional-looking interface with windows, buttons, menus and dialog boxes. The buttons and menu items simply invoke local code or remote Unix commands, as appropriate. A Windows interface to standard Usenet news takes the place of conferencing software on other systems, as well as making the news itself easier to access than with public-domain Unix news readers. Ivatury did a great job with the Pipeline installation process, which is about as easy as America Online's.

The first window matters

As the starting point for new subscribers, Pipeline's opening screen (think of it as its home page) is important. Gleick spends considerable time and thought on where buttons should go, what items will be visible and in what order. Interface design is not just for convenience or clarity: It also focuses attention -- like page layout at the Times. He may not be able to control the information that appears once a button has been clicked, but he works hard on making the local experience smooth. (Of course, what's up first matters everywhere: On Prodigy, vendors have doubled their sales by advertising on the front page.)

A few individuals have approached Gleick with the intent of writing software to run on Pipeline, including chat functions and a chess game. Gleick encourages them to do so and has made sure there are hooks in the code for third parties to use. Gleick and Ivatury plan many features for the next few releases of Pipeline software, including Mosaic and World Wide Web capabilities, powerful mail filters that can collect messages or postings from

specific places or meeting particular criteria and more focused and effective text-search capabilities by customizing the WAIS front-end.

SPRY'S INTERNET-IN-A-BOX

Founded in 1987, Spry Inc. started as a systems integrator and low-level connectivity software vendor. It became the Northwest's largest reseller of Novell NetWare, with many demanding clients including US West, Boeing, Nike and the US Navy. In the process, it got good at writing low-level, multi-protocol data-communications code that it turned into a series of products. Now many companies use its Windows socket drivers and other utilities that give Windows users access to TCP/IP.

Spry's ceo David Pool sees the low-level stuff getting commoditized. He believes that the company's future is in applications, so that's where he has focused its efforts. Since some of the infrastructure needed to make the applications business successful is still missing or nascent, Spry must fill in, as needed. So Spry is giving away the low-level stuff; writing some new code to facilitate sign-ups, which it will make public. It also provides commercial Internet services through a subsidiary called InterServ.

Internet-in-a-Box (IBox), the application suite it expects to deliver by April 1994, has won it much attention at a time when people are very puzzled about how to get on the Internet -- or even what that means. This product should make Spry's transition period easier.

What's in the box?

IBox combines a suite of Spry's Internet client applications with an Internet access provider, some software that should make it reasonably simple for adventurers to get on the Internet, and a book from Spry's partner in this venture, O'Reilly & Associates, a publisher of highly regarded technical books. One of Spry's client applications is the first commercial version of Mosaic (page 7), which the company has licensed from NCSA and is enhancing. The other applications include Spry's implementations of FTP, Telnet, mail, Gopher, news and WAIS clients, as well as Spry's Air Network File Manager, which makes Internet volumes look like remote drives in the Windows File Manager. A Macintosh version is in the works.

InterServ will furnish initial Internet services, using SprintLink's 800-number network. Netcom, ANS and PSI will also be available. InterServ will host the IBox servers, including Gopher, World Wide Web, Mosaic and a secure server running RAMP for new registrants (see box).

O'Reilly will market and distribute Internet-in-a-Box with a customized copy of its book, *The Whole Internet User's Guide and Catalog*, by Ed Krol (which we heartily recommend). Also, the IBox installation and registration process will automatically point buyers to the (currently free) Global Network Navigator, a World Wide Web server that O'Reilly runs. The GNN is an experiment in online publishing for O'Reilly, and includes a place where organizations can advertise products and services, which is unusual on the Internet. Eventually, Dougherty envisions a transaction facility on GNN that will hold subscriber account information and allow people to order those

products and services. Spry and O'Reilly originally connected when Pool contacted Dale Dougherty, who manages the GNN, about advertising Spry's services in it.

All aboard! Just climb the RAMP

Connections involving SLIP and PPP are not usually simple to install, configure and get running. Pipeline can make it simple because it has complete control over its software. To achieve similar simplicity, Spry wants to create a general-purpose solution with its Remote Account Maintenance Protocol (RAMP).

RAMP transactions are automated: A new subscriber logs in to a safe (isolated) server, which asks standard questions to open an account. The server then launches appropriate credit queries, if needed, and sets up not only a user ID and password, but also network and host identifiers, as well as pointers to home pages for various applications. Spry intends to publish RAMP in the hope that others will pick it up as a way of speeding up the new-account process.

"Right now, GNN is like a small-town newspaper: The drugstore down the street gives us the information and we publish everything. Eventually, we'll just point to them and they'll publish on our servers or their own."

-- Dale Dougherty, O'Reilly & Associates

To Pipe or to Box?

Individually, many of the IBox applications look similar to those in Pipeline. For example, both news readers use similar folder metaphors -- and are a darned sight easier to use than traditional news readers. But the two systems are very different at startup. Pipeline's main screen integrates all its functions and is carefully thought out so it will provide enough information to draw novices in, yet not enough to scare them off.

In contrast, IBox doesn't have a main screen: It melds into Windows as a series of applications in Windows' Program Manager. When an IBox user runs an application that requires Internet access, PPP software creates a modem session automatically. The session stays active in the background, waiting for applications to call it. (PPP will shut itself down automatically after a set idle time.) The user can then run any of Spry's other applications, such as Air Gopher to run Gopher. There's little editorializing from Spry or O'Reilly, other than what the default home pages for Gopher, World Wide Web and Mosaic are set to during the registration procedure. There's no masking of the strange Internet names. What they're called is what you get.

As you would expect, you trade ease-of-use for power and flexibility. IBox requires more knowledge from the user than Pipeline, but its architecture lets you swap components out, which means you could choose your preferred news reader or mailer (say, Eudora). Pipeline subscribers have to wait for the next revision of the software.

Although final packaging is not yet set, IBox seems more appropriate for corporate managers who want to bring their departments to the Internet, for small businesses in a similar situation or for savvy users who want very standard Internet access and considerable flexibility. Pipeline is for individuals who want access to the net's power, but would like some gentle guidance and a bit of translation. Spry treats the Internet as a hardware store and lets you play with the tools; Pipeline treats the Internet as a jungle and offers you a guide and an interpreter.

From the local net to the Internet

Compared to Pipeline, which is fixated on a single product with a strong sense of mission, Spry looks scattered. It has many products and product suites, which are hard for the uninitiated to distinguish. It also has many great ventures in the works. For example, Spry is working with Zenith to use Spry's Air Navigator suite of software applications with Zenith's \$500 HomeWorks cable tv residential LAN gateway. Spry is looking at wireless access and at offering a TCP/IP "back door" to more traditional online services. Then there's the RAMP protocol effort and InterServ magazine, an online publishing vehicle.

To succeed, Pool will likely have to sort out the product line, choose among the potential opportunities, find and express a unifying vision that works and execute it. Overall, though, Pool could have far worse problems than a wealth of great ideas and code to choose from.

INTERNET TOOLS 101: THE BUILDING BLOCKS

This section, which Internet connoisseurs may choose to skip, describes some of the Internet's component parts and protocols (we pointed to some of these briefly in Release 1.0, 4-93). Although this list is not exhaustive, it does cover most of the key features and functions that make the Internet useful and interesting.

In the beginning there was Multics...

The story of the Internet's popularization is the story of a long climb out of the primordial goo -- of people writing pieces of high-level code atop many component parts culled from others, while obeying rules that have been chiseled on soft tablets over time. As the National Center for Supercomputing Applications' Joseph Hardin says, "The history of the Internet could be looked upon as the struggle to get away from Unix."

There's a pattern to the emergence of Internet tools. First someone designs a core tool, usually around the unique traffic patterns and data stream characteristics of the desired application (e.g., sessions or file streams? graphics? error checking? huge files or datagrams? priority?) and makes it available on the Internet for others to try out and suggest modifications. Using the unadorned tools generally takes specific knowledge of file systems, command syntax and context. A review process standardizes the syntax and protocols for the most important applications.

This process can take quite a while. In the meantime, someone automates the tool with a script or client program; someone else creates pointers, summaries or indices, if they are needed. A university research group might like the tool, begin using it intensively and publish a variant. Finally, someone incorporates the new tools into meta-tools such as Gopher or World Wide Web, described below. At each higher level, the tool's internals are less visible and access across applications improves.

Sometimes new applications require resources that don't exist or enhancements to existing standards. As necessary, the Internet's task forces modify or add definitions to accommodate. The whole process is sort of recursive, nested and non-linear, not to mention time-consuming, but it works.

Practically all of the components mentioned in this section can be yours at little or no cost if you master file transfers across the Internet⁵ -- and maybe a little Unix. The the rest of this section roughly follows the sequence: mail, news, archival/file sharing/hypertext and text search. But first, some more details on the low-level stuff.

Bit parts

Since 1983, TCP/IP has been the Internet's primary binding agent. Among other tasks, the Transmission Control Protocol makes sure two processes (the

⁵ For pointers to and more detailed descriptions of the features and services described here, we recommend The Online Users' Encyclopedia: Bulletin Boards and Beyond (see Resources, page 21) by Bernard Aboba, president of MailCom and Internet consultant.

client and server portions of an application, for example) can exchange data without errors. TCP depends on the Internet Protocol, which routes packets across the network according to a numbering plan that lets the applications find each other. (The combination of a process and a host address is called a socket; a pair of sockets is called a connection.)

SLIP, the Serial Line Internet Protocol, allows for the transmission of TCP/IP over serial lines such as occasional dial-up sessions. PPP, the Point-to-Point Protocol, is a more recent Internet standard that performs a similar function, but can simultaneously handle multiple protocols, such as AppleTalk, IPX and IP.

With SLIP or PPP, your computer looks like a machine on the Internet, as opposed to a process running in some other host machine. To put it more colorfully, with ordinary dial-up access you're renting a room in a hotel, which has a restaurant, shops and meeting rooms; with SLIP and PPP you look like a hotel, but have to provide the amenities yourself. That means you have more control, but also more overhead and complexity to manage.

Give or take a few protocols, the Internet's ball bearings are the File Transfer Protocol (FTP), the Net News Transfer Protocol (NNTP), the Simple Mail Transfer Protocol (SMTP) and the Post Office Protocol (POP). They come with most implementations of Unix and enable the smooth interchange of files, data streams and messages across the Internet. Individuals can use FTP to fetch and send files; the other protocols are mostly for server-to-server communications. Also, Telnet is a way to open a session across the Internet to a remote machine, where the user can use a library catalog or an online service (an application called Hytelnet is a guide to Telnet sites).

E-mail etc.

Clearly, Internet e-mail is a great asset all by itself. You can do lots over e-mail, and you don't need an upscale Internet connection to do it. With list servers⁶ you can participate in discussions similar to those held in online systems' bulletin boards or even in Lotus Notes. Popular mail readers (client applications) include Elm (ELECTRONIC Mail) and Pine (Pine Is Nearly Elm). They perform the same function but are not related.

E-mail can be used as a primitive remote-query tool. Messages can contain commands that retrieve document indexes or individual files. The process isn't quick or standardized enough yet (sometimes commands should be inside subject lines, sometimes in the message bodies). Such queries and requests also require users to remember many details. Information from many Telnet sites is available, in limited fashion and with some foreknowledge and manual labor, via e-mail.

6 Users subscribe to a list, usually for free, then receive any messages that are posted to that list as separate messages or as a digest. They can also post messages themselves. Some lists are moderated, which means someone chooses which messages to rebroadcast, offering some guidance; others are not, so all messages are sent to all subscribers.

The ultimate cottage industry?

Here's an example of how the bootstrapping process works: The Archie program (created by the Archie Group at McGill University) uses the FTP program nightly to update the names of files available at over 1300 FTP sites -- though not all at once. It also uses another Internet tool, WhatIs, to get file descriptions.

So instead of browsing multiple FTP sites looking for a file, a user can query an Archie archive first and get a proper pointer and short description, if one is available. Meta-tools such as the World Wide Web and Mosaic can point to files directly (and invoke FTP in the background), to Archie servers and so on.

This process should get easier as MIME (the Multimedia Internet Messaging Enhancements, see Release 1.0, 12-93) matures and finds widespread use. MIME takes e-mail beyond plain text. Making it pervasive has more to do with agreements than with technology. Compliant mail client applications hand MIME objects (e.g., RTF, JPEG, TIFF, sound files) to MIME, which dispatches them to a viewer. As long as the platform-specific viewer modules are distributed broadly, everyone can see and use the objects. One can easily imagine a standard forms capability in MIME that allows users to make requests and select documents they need over e-mail.

The huge flow of Usenet or Net News items basically consists of e-mail messages organized into topics (news groups), the NNTP protocol and a reader. Despite many variants on the original readnews (including ones called NN, TRN and TIN, as well as a program called EEP, which helps users customize the order in which news groups are displayed), news readers are among the most difficult client applications to use.

Gopher: from Love Boat character, to congressman, to search tool

Gopher, created at the University of Minnesota, is a meta-tool: It supports many of the other tools described so far. Gopher can invoke Telnet, search Archie databases, query WAIS servers, search for other Gophers, transfer files and so on. Gopher's great popularity may be due in part to its simplicity. Practically anyone can understand and navigate within it.

Among other things, Gopher automates FTP commands and hides file types and directories. Instead of having to know specifically where to go, log into an FTP server, find a file, specify "get <filename> from <pathname>," log out and finally read the file, Gopher users just browse through hierarchical menus with cursor keys.⁷

⁷ Gopher is strangely reminiscent of ISPF, the Interactive Systems Programming Facility on IBM mainframe systems running MVS, with which intrepid users could build and customize their menus. One significant thing Gopher adds is scope: Any menu choice can just as easily transport the user across the Internet to another site as to a local file.

Hiding all those commands, pointers and file details is powerful: It's the difference between having an address and having an interactive map that actively takes you to the address you need. The map gives you context and helps you orient yourself. Of course, Gopher "maps" are text-only; Mosaic and other tools, described below, add visual cues.

*Publishing our government's products, documents and processes
 on the Internet makes the government's value visible to people.
 And its follies.*

Do your own

You can publish documents of your own on the Internet with Gopher. If your Internet access provider does not offer a Gopher server, you can get it, and the client software, from the University of Minnesota. Once you have access to Gopher, create your own home page and content documents. Then announce your Gopher's presence across the Internet by posting its home page's address to <gopher@boombox.micro.unm.edu>, the central axis of Gopherspace. When others can get to your home page, they can get to all the documents your server references...and bring your server to its knees.

Just as Archie automatically indexes the contents of FTP servers, Veronica, the Very Easy Rodent-Oriented Netwide Index to Computerized Archives, indexes the resources of Gopherspace.

Power searches

WAIS (Wide-Area Information Servers) is a search-and-retrieval tool for document databases on the Internet (see Release 1.0, 4-93 and 4-91). Brewster Kahle created WAIS at Thinking Machines, where he was working on superfast, parallel text searches. Now he's the president of WAIS, Inc., from which you can purchase WAIS server software (see Resources, page 21).

WAIS complements existing search tools: Archie and Veronica let you do simple searches of materials in FTP and Gopher servers, respectively; Telnet lets you get to individual search engines (say, the Library of Congress online catalog) and search only their spaces with their custom search engines. WAIS lets you do powerful simultaneous searches of documents on distributed WAIS servers. Its features include relevance ranking, Boolean logic, proximity and similarity ("more like this") searches. WAIS uses a protocol called Z39.50, which allows the results-list of a search to contain pointers to actual documents, rather than merely their names.

All together now: the World Wide Web

The World Wide Web (W3) was developed at CERN in Switzerland. Like Gopher, it is a meta-tool, and takes advantage of most other Internet tools. To go from FTP to W3 is to go from hard-to-find to at-your-fingertips, from explicit file typing to point-and-click, from coarse-grained links to fine-grained, and from utilitarian to compelling. NCSA Mosaic (page 7) adds features including font support and in-line graphics, which turns compelling into elegant.

With FTP, participants "publish" their materials by placing files in the proper directories. Browsing or Archie searches will turn their documents up. Gopher requires explicit tagging of documents, but documents are easier to find through its hierarchical menus and transparent downloads. In Gopher, menu items are links and documents are destination points; the two are separate. In W3, any element on a page can be a link. Even inside destination documents, any element can be a link, too, as long as the documents are created using HTML, the HyperText Markup Language (see box).

`<title>HTML, URLs and URNs</title>`

HTML is a subset of SGML, the Standard Generalized Markup Language (see Release 1.0, 4-91), which has found broad use for creating and publishing large, structured documents in the defense, pharmaceutical and aerospace industries. It's relatively simple to make HTML content pages, as well as to link elements on those pages to other documents, applications and information -- locally and across the Internet. Of course, HTML uses its own protocol, the HyperText Transfer Protocol, to move around the Internet.

An HTML viewer program ignores a source document's spacing and instead pays attention to tags the author puts in the text, usually at the beginning and end of the item she wishes to tag. For example, `` and `` delimit a bulleted list, with `` at the start of each bullet item. The viewer determines what the bullet looks like and which font to use. It may sound clunky, but it's simple and precise, and it allows different HTML applications, such as Cello, a W3 client developed at Cornell, to display page elements as well as possible on a multitude of platforms.

In an effort to simplify the creation of HTML materials, people have adapted editors, including emacs, Word macros and HyperCard stacks. People have prototyped a few converters for HTML, including RTF, Postscript and Frame. These are clearly useful tools; more are in the works.

HTML uses "anchors" to point to other documents. These anchors use an emerging standard called the Uniform Resource Locator, which specifies a document's location and transfer protocol, which it states as a protocol/path/port label (e.g., `http://panix.com:60/pub/demo/test.html`). Some Internet entities, including Usenet news, don't have URLs yet.

A hypertext web's usefulness is, of course, directly related to the number and quality of its links. As linkable elements get smaller and the links get easier to create, the number of links increases. Also, they become a bit harder to find and manage. After a while, it's easy for the problem to escalate, creating a monster link-management problem. Since nobody's written link-management tools yet, link maintenance may remain a thorny problem for some time.

WELCOME AGAIN, JERRY MICHALSKI!

In October 1992 we welcomed Jerry Michalski to Release 1.0, in the hope that he could take over some of my writing duties. Over the past year, he has done a wonderful job, helping us to broaden the scope of the newsletter and lead us into new virtual territory. Now he will take over day-to-day writing responsibility as managing editor, while I will continue to set overall direction, edit his work and contribute occasional articles and essays. We will continue to explore the interplay of technology and business and social dynamics, with both vision and nitty-gritty analysis of new products -- or ones we think should be created. Jerry will also manage our move into some kind of online presence, which we will work out interactively with you, our readers, as you contribute to its content.

Personally, I will do less in-depth research while spending more time on meetings and industry affairs, including the US Government's National Information Infrastructure Advisory Council, to which I was recently appointed. I have no formal charter on the Council beyond "giving advice" to Al Gore and his team, so I would be delighted to represent you (as interpreted by me, of course!) if you care to press your views on the issues raised. Please let me know, by any of the usual ways. Many of these issues, of course, we have covered and continue to cover in Release 1.0: issues of intellectual property, control of bandwidth and content, privacy, the role of advertising, the need for "two-way interactivity" and the need for open standards.

Separately, we are becoming increasingly active in Europe, as are most of you readers. (It's my personal goal to make the software industry global as well as to get it all on-line!) We plan to start a third Forum, in Western Europe in the spring of 1995, to complement PC Forum and East-West High-Tech Forum. Daphne Kis, publisher of Release 1.0 and de facto chief operating officer of EDventure Holdings, will manage that effort along with me. Finally, I am starting a venture fund, EDventure Ventures, to invest in East European software start-ups. I will be the general partner, with majority funding from Lee Keet, a long-time US entrepreneur and investor who now runs ECSOft from France.

Overall, I will continue to be intimately involved with the industry and with you. Over the years, I have accumulated a set of roles that keeps me firmly connected (and increasingly busy!): Aside from the NII AC, I am a member of the boards of the Electronic Frontier Foundation, the Santa Fe Institute and the Global Business Network, and of the advisory boards of the Software Entrepreneurs' Forum, the Poynter Institute for Media Studies and Perot Systems. (I'm also a limited partner of the Mayfield Software Partners, for which I do no formal work beyond a pleasant dinner in Palo Alto every two months, but it too keeps me in touch with a group of stellar entrepreneurs.) After long years observing this community, I can no longer claim to be an impartial observer -- which I hope will add value to the comments I will continue to publish in Release 1.0. Okay, Jerry, the next page is yours.

-- Esther Dyson, editor

HELLO AGAIN

I'm extremely pleased to be this newsletter's new managing editor. This is a great time to be covering information and communication technology, especially with the charter to explore and explain issues that most people don't get the time to address. Over the years, Esther has made Release 1.0 one of the most credible and influential platforms for insightful ideas and opinions in this domain. With her guidance, I intend to preserve the quality, depth and vision that characterizes this newsletter -- and its quirkiness, too.

As we move forward, we'll change some things and we'll keep some constant. Those of you who love monospace fonts will be disappointed; those who love to carry the newsletter on long flights and mark it up won't be. As Esther says above, we'll have some form of online presence. Whatever we do, we will remain a source of insight and commentary. We will find and define the concepts that you'll feed your smart agents and keyword filters. We'll also stay focused on how to build profitable businesses amid all this chaos.

As your live agents, we'll continue to cover infrastructural issues such as wireless communications, unified messaging and the information superhighway; social issues such as collaboration, privacy, communities and interface design; business issues such as transactions, distribution, advertising and intellectual property; and technological issues such as computer-telephone integration, multimedia authoring and pattern recognition. We'll delve into entertainment, education and multiplayer games, and uncover underlying principles. We'll cover interesting hardware and wetware, and try to use what we write about. We won't get cortical implants, but we will explore things such as mobility and message management firsthand.

Our activity is part of our value to you. We travel to places you might not get to, point to things you might not see, describe things in new ways and help connect people who ought to meet. Esther's new roles will enrich our content and broaden our reach. Her continued work with me will provide insight and a reality check.

We also believe that there are new audiences we can reach. Corporate users (and consumers, to a certain extent) are playing a more active role in setting industry directions and adding value to products and to each other. We want to bring them in. Some people think of Release 1.0 as a thoughtful monthly white paper; others want to connect with each other. We want to serve both constituencies.

Your help would thrill us and help assure that our changes will work for you. If you feel inspired before the Forum or can't attend, send me your ideas (e-mail <spiff@panix.com> or <spiff@radiomail.net>, courtesy of Ardis; fax 1 (212) 924-0240). Or bring them to the last session at the PC Forum. We look forward to seeing many of you there, and to communicating with all of you in useful new ways in the future. For me, it's a privilege to write for you and to work with everyone in this office.

-- Jerry Michalski, managing editor

RESOURCES & PHONE NUMBERS

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 Joseph Hardin, National Center for Supercomputing Applications (NCSA),
 (217) 244-3473; fax, (217) 244-1987; <hardin@ncsa.uiuc.edu>
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 David Pool, Spry, (206) 442-8252; fax, (206) 447-9008; <dave@spry.com>
 Brewster Kahle, WAIS Inc., (415) 617-0440; fax, (415) 327-6513; <front-desk@wais.com>

For further reading:

Bernard Aboba, *The Online User's Encyclopedia: Bulletin Boards and Beyond*, Addison-Wesley 1993.
 Ed Krol, *The Whole Internet User's Guide and Catalog*, O'Reilly & Associates 1993, (800) 998-9938

COMING SOON

- *New! Improved! Multimedia!*
- *Agents savants.*
- *Software for education.*
- *The analog world.*
- *And much more... (If you know of any good examples of the categories listed above, please let us know.)*

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PLATFORMS FOR COMMUNICATION FORUM -- March 20 to 23
Interactivity is two-way!

Each year, the Forum raises issues that will play out in the year ahead. Last year, our theme was "content is key" -- a theme echoed throughout 1993 as media giants and telecom and computer companies tried to converge with alliances, technology transfers, people moves and the like.

We have changed PC Forum's full first name from Platforms for Computing to Platforms for Communication -- reflecting computers' changing role in the real world. The focus is no longer person and computer, but people communicating through computers.

This year, our theme is "Interactivity is two-way!" Our goal at the Forum is to examine -- interactively with you -- the new virtual landscape of the computer industry, from both technical and business perspectives. Specific topics we'll address in general sessions -- and in the corridors, bars, social events and sports facilities nearby -- include the design of on-line video-conferencing salons, the role of traditional entertainment companies in the new world of "convergence," and the impact of government agencies and policies. (Each Release 1.0 subscription -- plus the fee! -- entitles you to two Forum registrations.)

Speakers and panelists include (additions marked *):

*Adrian Rietveld	WordPerfect
John Seely Brown	Xerox
Jim Cannavino	IBM
Steve Case	America Online
*Pehong Chen	BroadVision
*Scott Cook	Intuit
*Maury Cox	CompuServe
Bob Epstein	Sybase
*Lori Fena	Technology Board of Trade
John Gage	Sun Microsystems
Joe Guglielmi	Taligent
*John Hiles	Thinking Tools
Stacy Horn	Echo
Bob Kavner	AT&T
*Bruce Katz	The Well
Scott Kurnit	Prodigy
Ed McCracken	Silicon Graphics
Mike Maples	Microsoft
*Ellen Pack	Women's Wire
Marc Porat	General Magic
*John Sculley	Spectrum
Bruce Sterling	Himself

Company presentations, services and demos will include Collabra, Connect, Data Base Architects, Echo, Excalibur, Kaleida, Linguistic Technology, Metricom, nett info, RadioMail, Silicon Graphics, Tadpole, Taligent, TeleSim or SimHealth, The Washington Post on-line, Ziff-Davis Interactive and Bobby Orbach's channel roundtable.

RELEASE 1.0 CALENDAR

- February 1-2** **Powering up North America: Realizing the information infrastructure for a knowledge-based continent** - Toronto. Sponsor: Information Technology Association of Canada. With George Gilder, Bill Murphy, Nicholas Negroponte, Sheryl Handler. Call Julia Williamson, (416) 862-9067; (416) 862-2238.
- February 2-4** ***Executive technology summit '94** - Tampa. Sponsor: Computer-world. Call Paul Gillen, (508) 620-7724; fax, (508) 875-8931.
- February 13-15** **Document management & workflow conference** - San Diego. Sponsored by BIS Strategic Decisions. Call Martha Popoloski, (617) 982-9500; fax, (617) 878-6650.
- February 15-17** **Networks Expo (formerly NetWorld)** - Boston. Sponsored by Bruno Blenheim. Call Annie Scully, (201) 346-1400 or (800) 829-3976; fax, (201) 346-1532.
- February 16-17** **LAN-Mail '94** - Washington, DC. Sponsor: Telecommunications Reports. Call J.C. Ermis, (202) 842-3023; fax, 842-3022.
- February 18-20** **Artificial life and evolutionary biology workshop** - Santa Fe. Sponsored by the Santa Fe Institute. Call Barbara Hodges, (505) 984-8800; fax, (505) 982-0565.
- February 21-24** **GIS '94: Symposium on geographic information systems** - Vancouver. Sponsored by Polaris Conferences. Call Penny Sopel, (604) 688-0188; fax, (604) 688-1573.
- February 21-25** **Documation '94** - Los Angeles. Sponsored by GCA. Call Marion Elledge, (703) 519-8160; fax, (703) 548-2867.
- Feb 27-Mar 4** ***GroupWare & Workflow '94** - Boston. Sponsor: Conference Group. With Esther Dyson. Call David Coleman, (415) 282-9151; fax, (415) 550-8556.
- March 1-3** **Intermedia '94** - San Jose. Sponsored by Reed International. Call David Bradway, (203) 352-8243; fax, (203) 352-8445.
- March 1-3** **OpCon West** - Santa Clara. Sponsored by Soft-Letter. Call Jeff Tarter, (617) 924-3944; fax, (617) 924-7288.
- March 2-4** ***Converging technologies conference** - St. Petersburg, FL. Sponsored by the Poynter Institute for Media Studies. Call Jennette Smith, (813) 821-9494; fax, (813) 821-0583.
- March 2-4** **Cellular telephone industry association conference** - San Diego. Sponsor: CTIA. Call Randy Smith, (301) 694-5599.
- March 3-4** **@Computer-Telephone integration '94** - Dallas. Sponsored by TCS, Rockwell International, Intervoice. Call Ernest Rapp, (713) 974-6637; fax, (713) 974-6272. With Jerry Michalski.
- March 4-5** **Designing for and with people** - Santa Cruz. Sponsor: Association for Software Design. A workshop on user-centered design. Call Cynthia Lewis, (510) 841-5808; fax, (510) 848-4721.

Please let us know about other events we should include. -- Denise DuBois

**Events Esther plans to attend.*

@Events Jerry plans to attend.

Lack of a symbol is no indication of lack of merit.

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